Serial No. 10/049,875

IN THE CLAIMS:

1. (currently amended) A heat treated silicon wafer ~~for non-oxidative heat treatment~~ for use in semiconductor device manufacture, wherein the silicon wafer is obtained by slicing a silicon wafer from a silicon ingot being prepared by a Czochralski method or a MCZ method, wherein the sliced silicon wafer has a V-rich region, an I-rich region, a nitrogen concentration ~~is~~ in ~~the~~a range from 5 X 10^{13} atoms/cm^3 to 1 X 10^{15} atoms/cm^3 and includes void defects; and wherein the heat-treated silicon wafer is prepared by heat-treating the sliced silicon wafer under a non-oxidative atmosphere such that the void defects of a wafer surface layer thereof are reduced.

2. (currently amended) A silicon wafer for non-oxidative heat treatment for use in semiconductor device manufacture, wherein the silicon wafer is obtained from a silicon ingot being prepared by a Czochralski method or a MCZ method with V/G1 higher than 0.18 mm^2 / °C min and not exceeding 0.4 mm^2 / °C min where V is a pulling speed and G1 is a temperature gradient in a vicinity of a solid/liquid interface, and wherein the silicon wafer contains nitrogen concentration ~~is~~ in ~~the~~a range from 5 X 10^{13} atoms/cm^3 to 4 X 10^{14} atoms/cm^3.

3. (currently amended) ~~A~~The heat-treated silicon wafer ~~for non-oxidative heat treatment for use in semiconductor device manufacture~~ according to claim 1, wherein the silicon wafer is ~~a silicon wafer for hydrogen~~ heat-treated ~~treatment or a silicon wafer for~~ under a hydrogen atmosphere, an argon atmosphere, ~~annealing~~or a combination thereof.

4. (currently amended) A method of manufacturing a silicon ingot for manufacturing ~~of~~ silicon wafers for non-oxidative heat treatment, the method comprising: ~~wherein a method of manufacturing a silicon ingot by~~ pulling a silicon single crystal by a Czochralski method or a MCZ method to manufacture the silicon ingot, wherein nitrogen is doped and the silicon single crystal is pulled under ~~a~~ conditions that a portion of the silicon single crystal is formed in which nitrogen concentration is from 5 X 10^{13} atoms/cm^3 to 1 X 10^{15} atoms/cm^3 and that V/G1 is higher than 0.18 mm^2 / °C min and not exceeding 0.4 mm^2 / °C min where V is a pulling speed and G1 is a temperature gradient in a vicinity of a solid/liquid interface.

5. (currently amended) ~~A~~The silicon wafer ~~for manufacturing a semiconductor device manufactured by hydrogen heat treatment or argon annealing of the silicon wafer for non-oxidative heat treatment~~ according to claim ~~1~~2, wherein the silicon wafer is for heat treatment under a hydrogen atmosphere, an argon atmosphere, or a combination thereof.

6. (currently amended) A silicon wafer for semiconductor device manufacture, having 3 μm of a surface layer removed wherein a doping amount of nitrogen thereof is ~~adjusted taking into account life of a virtual element~~determined such that an annealed silicon wafer achieves a predetermined oxide film withstand-voltage non-defective ration with TZDB test after said removal of a surface layer of 3 μm.

7. (currently amended) A method of ~~evaluating~~determination of a doping nitrogen-concentrationdoped of a silicon wafer ~~wherein decision as to whether or not the nitrogen-doped wafer can be used as a wafer~~ for semiconductor device manufacture ~~is made by calculating life of a virtual element on a nitrogen-doped heat treatment wafer~~comprising:

heat-treating a silicon wafer doped with nitrogen under non-oxidative atmosphere such that void defects of a surface layer are reduced so as to obtain the nitrogen-doped silicon wafer;

removing the surface layer from the nitrogen-doped silicon wafer; and

conducting a TDDB or a TZDB test for the nitrogen-doped silicon wafer.

8. (currently amended) The method ~~of evaluating wafers~~ according to claim 7, wherein ~~the method of calculating the life of the virtual element on the wafer is~~ the TDDB test determines an upper limit of the nitrogen concentration.

9. (new) The heat-treated silicon wafer according to claim 1, wherein the nitrogen concentration is in a range from 5×10^{13} atoms / cm^3 to 4×10^{14} atoms / cm^3.

10. (new) The heat-treated silicon wafer according to claim 1, wherein the nitrogen concentration is in a range from 1×10^{14} atoms / cm^3 to 4×10^{14} atoms / cm^3.

11. (new) The heat-treated silicon wafer according to claim 1, wherein the silicon ingot is prepare by a Czochralski method or a MCZ method with V/G1 higher than 0.18 mm^2 / °C min and not exceeding 0.4 mm^2 / °C min where V is a pulling speed and G1 is a temperature gradient in a vicinity of a solid/liquid interface.

12. (new) The heat-treated silicon wafer according to claim 9, wherein the silicon ingot is prepared by a Czochralski method or a MCZ method with V/G1 higher than 0.18 mm^2 / °C min and not exceeding 0.4 mm^2 / °C min where V is a pulling speed and G1 is a temperature gradient in a vicinity of a solid/liquid interface.

13. (new) The heat-treated silicon wafer according to claim 10, wherein the silicon ingot is prepared by a Czochralski method or a MCZ method with V/G1 higher than 0.18 mm^2 / °C min and not exceeding 0.4 mm^2 / °C min where V is a pulling speed and G1 is a temperature gradient in a vicinity of a solid/liquid interface.

14. (new) The heat-treated silicon wafer according to claim 1, wherein the heat treatment is under a hydrogen atmosphere, an argon atmosphere, or a combination thereof.